CLAIMS

1. Rotational control apparatus comprising, in combination: an input rotatable about an axis; an output rotatable about the axis and relative to the input, with each of the input and the output including a friction engaging surface rotatably fixed thereto at a radial spacing from the axis; means for engaging the friction engaging surfaces of the input and output together to rotatably relate the input and output in an engaged condition and for disengaging the friction engaging surfaces of the input and output in a disengaged condition; and an eddy current drive including permanent magnets and a ring of magnetic material, with the permanent magnets being rotatably fixed at the radial spacing from the axis to one of the input and the output and the ring of magnetic material being rotatably fixed at the radial spacing from the axis to the other of the input and the output.

2. The rotational control apparatus of claim 1 wherein the output is driven either with the input when the friction engaging surfaces are in the engaged condition or at a rotational speed less than the input when the friction engaging surfaces are in the disengaged condition by the eddy current drive and without separate controls for the eddy current drive whereby the output is driven with the rotational speed of the output being controlled by and dependent upon the condition of the friction engaging surfaces.

3. The rotational control apparatus of claim 2 wherein the output includes a first, friction disc portion slideably mounted on and rotationally related to a hub rotatably mounted on a shaft, with the input being rotatable relative to the hub and to the shaft, with the first, friction disc portion being reciprocal on the hub between a first position to rotatably relate the first, friction disc portion to the input to drive the hub and a second position with the first, friction disc portion being rotatably independent from the input.

4. The rotational control apparatus of claim 3 wherein one of the ring of magnetic material and the permanent magnets is mounted on the first, friction disc portion opposite to the friction engaging surface; and wherein the other of the ring of magnetic material and the permanent magnets is carried by the input.

5. The rotational control apparatus of claim 4 wherein the ring of material and permanent magnets have an increased spacing as the first, friction disc portion is reciprocated from its second position to its first position.

6. The rotational control apparatus of claim 4 wherein the other of the ring of magnetic material and the permanent magnets is mounted to an annular body portion; and wherein the rotational control apparatus further comprises, in combination: means on the annular body portion for providing angular and perpendicular air flow during rotation of the input for cooling the annular body portion.

7. The rotational control apparatus of claim 6 wherein the air flow providing means comprises circumferentially spaced cooling fins formed on the annular body portion opposite to the other of the ring of magnetic material and the permanent magnets.

8. The rotational control apparatus of claim 7 wherein the annular body portion includes first, second, third, and fourth quadratures, with the cooling fins in the first and third quadratures arranged solely at an acute angle from radial lines from the axis in the direction of rotation and the cooling fins in the second and fourth quadratures arranged along radial lines from the axis.

9. The rotational control apparatus of claim 4 wherein the other of the ring of magnetic material and the permanent magnets is mounted to an annular body portion, with the annular body portion being mounted to the input by an annular support, with the annular support including vanes located radially outward of the ring of magnetic material and the permanent magnets for drawing air radially outwardly intermediate the ring of magnetic material and the permanent

magnets.

10. The rotational control apparatus of claim 1 further comprising, in combination: means for rotating the hub on the shaft at a speed different from the speeds when the first, friction disc portion is in the first and second positions.

11. The rotational control apparatus of claim 10 wherein the different speed rotating means comprises, in combination: a second, friction disc portion slideable and rotationally related to the shaft, with the second, friction disc portion being reciprocal between a first position to rotatably relate the second, friction disc portion and the hub and a second position with the hub being rotatably independent from the second, friction disc portion and the shaft.

12. In a rotational control apparatus including a first, friction disc portion slideably mounted on and rotationally related to a hub rotatably mounted about an axis on a shaft and including an input rotatable about the axis and relative to the hub and to the shaft at a first rotational speed, with the first, friction disc portion being reciprocal on the hub between a first position to rotatably relate the first, friction disc portion to the input to drive the hub at the first rotational speed and a second position with the first, friction disc portion being rotatably independent from the input, the improvement comprising means for rotating the hub on the shaft at a second speed different from the first rotational speed when the first, friction disc portion is in the second position with the rotating means including a first drive component carried by the input and a second drive component mounted to the first, friction disc portion, with the spacing between the first and second drive components changing as the first friction disc portion moves from the second position to the first position.

15. The rotational control apparatus of claim 14 wherein the first, friction disc portion is rotatably related to the input by a friction ring engaging an annular friction engageable portion, with the friction ring and the

engageable portion being at a radial spacing from the axis, with the first and second drive components being at the radial spacing from the axis.

16 ~~14~~. The rotational control apparatus of claim ~~13~~ 15 wherein the second speed is slower than the first speed.

17 ~~15~~. The rotational control apparatus of claim ~~14~~ 16 wherein the rotating means comprises an eddy current drive.

16. The rotational control apparatus of ~~claim 15 wherein~~ the second drive component is permanent magnets and the first drive component is a ring of magnetic material.

19 ~~17~~. The rotational control apparatus of claim ~~12~~ 14 further comprising, in combination: means for rotating the hub on the shaft at a third speed different from the first and second speeds when the first, friction disc portion is in the second position.

~~18~~ ~~16~~. The rotational control apparatus of claim ~~17~~ 19 wherein the third speed is zero such that relative rotation does not occur between the hub and the shaft.

~~19~~ ~~17~~. The rotational control apparatus of claim ~~18~~ 20 wherein the third speed rotating means comprises, in combination: a second, friction disc portion slideable and rotationally related to the shaft, with the second, friction disc portion being reciprocal between a first position to rotatably relate the second, friction disc portion and the hub to brake the hub and a second position with the hub being rotatably independent from the second, friction disc portion and the shaft.

~~20~~ ~~18~~. The rotational control apparatus of claim ~~12~~ 14 wherein the input is rotatably mounted on the hub.

~~21~~ ~~19~~. The rotational control apparatus of claim ~~12~~ 14 wherein the first drive component is mounted to an annular body portion, with the annular body portion being mounted to the input by an annular support, with the annular support including vanes located radially outward of the first and second drive components for drawing air radially outwardly intermediate the first and second drive components.

22. In a ~~rotational control~~ apparatus including an

input rotatable about an axis, an output rotatable about the axis and relative to the input, and first and second drive components carried by the input and output, respectively, for rotatably relating the input and the output, the improvement comprising, in combination: an annular body portion including first, second, third, and fourth quadratures, with one of the first and second drive components mounted to the annular body portion; and circumferentially spaced cooling fins formed on the annular body portion opposite to the drive component, with the cooling fins in the first and third quadratures arranged at an acute angle from radial lines from the axis in the direction of rotation and the cooling fins in the second and fourth quadratures arranged along radial lines from the axis.

23. The rotational control apparatus of claim 22 wherein the annular body portion is mounted by an annular support, with the annular support including vanes located radially outward of the first and second drive components for drawing air radially outwardly intermediate the first and second drive components.

24. The rotational control apparatus of claim 23 wherein the output includes a mount, with the mount having openings radially inward of the first and second drive components, with the vanes drawing air through the openings and intermediate the first and second drive components.

25. In a rotational control apparatus including an input rotatable about an axis, an output rotatable about the axis and relative to the input, and first and second drive components carried by the input and output, respectively, for rotatably relating the input and the output, the improvement comprising, in combination: vanes located radially outward of the first and second drive components for drawing air radially outwardly intermediate the first and second drive components for creating air flow between the first and second drive components to provide cooling for the first and second drive components.

26. The rotational control apparatus ~~of claim~~ 25 wherein the output ~~includes~~ openings located radially inward of the first and second drive components.

~~32~~ 27. The rotational control apparatus of claim ~~25~~ 31 wherein the first drive component is mounted to the input by an annular support, with the annular support including the vanes.

28. The rotational control apparatus of ~~claim~~ 27 wherein the output includes a mount, with the mount having openings radially inward of the first and second drive components, with the vanes drawing air through the openings and intermediate the first and second drive components.

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